

SITE	ST	CALL	LATITUDE	LONGITUDE	BEARING	PLAN	FREQUENCIES	BAND	OWNER
540 BROAD	NJ	540BRO	40 44 34	74 10 8	145.9	H4	12	23	NEW JERSEY BELL TELEPHONE CO. ANY
55 WATER	NY	55 WAT	40 42 8	74 0 33	345	L1	0	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	159.2	L8	6	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	159.2	L8	12	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	20.2	L8	4	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	345	L8	12	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	345	L2	12	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	345	L8	4	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	345	L8	6	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 0	74 0 33	345	L8	12	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	20.2	L1	4	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	159.2	L1	8	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	20.2	L8	3	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	159.2	L8	12	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	159.2	L2	12	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	159.2	L8	9	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	159.2	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	20.2	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
55 WATER	NY	55 WAT	40 42 8	74 0 33	328.1	H4	2	23	LOCAL AREA TELECOMMUNICATIONS INC
592 TH AVE	NY	5925TH	40 45 26	73 58 45	210.7	L3	1	23	NATIONAL WESTMINSTER BANK USA
5 PENN PLAZA	NY	5PENNP	40 45 0	73 59 37	24.9	N5	1	18	LOCAL AREA TELECOMMUNICATIONS INC
5 PENN PLAZA	NY	5PENNP	40 45 0	73 59 37	221.3	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
5 PENN PLAZA	NY	5PENNP	40 45 0	73 59 37	125.3	L8	3	18	LOCAL AREA TELECOMMUNICATIONS INC
5 WTC	NY	5WTC	40 42 43	74 0 39	124.2	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
60 BROAD	NY	60 BRO	40 42 18	74 0 46	124.1	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
60 BROAD ST	NY	60BROA	40 42 18	74 0 46	301.2	H8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
60 BROAD ST	NY	60BROA	40 42 18	74 0 46	25.9	L4	8	23	LOCAL AREA TELECOMMUNICATIONS INC
60 BROAD ST	NY	60BROA	40 42 18	74 0 46	119.4	L4	10	23	LOCAL AREA TELECOMMUNICATIONS INC
60 HUDSON ST	NY	60HUDS	40 43 3	74 0 33	247.7	L8	2	18	SATELLITE GATEWAY
67 BROAD	NY	67BROA	40 42 16	74 0 45	124.5	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
67 BROAD	NY	67BROA	40 42 16	74 0 45	86.4	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	308.9	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	308.9	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	308.9	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	20.2	H8	4	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	350.6	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	20.2	H1	4	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	20.2	H8	3	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	20.2	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
6TH AVE	NY	6THAVE	40 45 40	73 58 52	124.5	L8	1	18	LOCAL AREA TELECOMMUNICATIONS INC
7 WII	NY	7 WII	40 42 17	74 0 58	200.8	L8	7	18	LOCAL AREA TELECOMMUNICATIONS INC
7 WII	NY	7 WII	40 42 17	74 0 58	200.8	L8	2	18	LOCAL AREA TELECOMMUNICATIONS INC
7 WII	NY	7 WII	40 42 17	74 0 58	200.8	L8	10	18	LOCAL AREA TELECOMMUNICATIONS INC
7 WII	NY	7 WII	40 42 17	74 0 58	200.8	L1	8	18	LOCAL AREA TELECOMMUNICATIONS INC
7 WII	NY	7 WII	40 42 17	74 0 58	200.8	L2	12	18	LOCAL AREA TELECOMMUNICATIONS INC
7 WII	NY	7 WII	40 42 17	74 0 58	200.8	L8	10	18	LOCAL AREA TELECOMMUNICATIONS INC
75 WALL STRE	NY	75WALL	40 42 21	74 0 31	58.8	L4	1	23	LOCAL AREA TELECOMMUNICATIONS INC
7TH AVE	NY	7THAVE	40 45 6	73 59 27	43.2	H1	8	18	LOCAL AREA TELECOMMUNICATIONS INC
7TH AVE	NY	7THAVE	40 45 6	73 59 27	43.2	H2	12	18	LOCAL AREA TELECOMMUNICATIONS INC
7TH AVE	NY	7THAVE	40 45 6	73 59 27	43.2	H8	10	18	LOCAL AREA TELECOMMUNICATIONS INC
7TH AVE	NY	7THAVE	40 45 6	73 59 27	43.2	H8	10	18	LOCAL AREA TELECOMMUNICATIONS INC

AFFIDAVIT OF JEFFREY A. KRAUSS

I, Jeffrey A. Krauss, being duly sworn, do depose and state as follows:

1. I am a Communications Consultant specializing in Telecommunications and Technology Policy retained by Hye Crest Management, Inc.
2. I am familiar with the factual matters presented in Sections 2, 3, 4 and 5 of the foregoing Response of Hye Crest Management, Inc. in File No. 10380-CF-P-88. Except for those factual matters of which official notice may be taken, which are matters of public record, or which are supported by separate affidavit, the factual matters presented in the foregoing Sections are true to my personal knowledge.

Date

10/13/88

  
Jeffrey A. Krauss

Subscribed and sworn before me this 13th day of October, 1988.

  
Notary Public

My Commission Expires: 6/14/92

**AFFIDAVIT OF THOMAS HAYES**

I, Thomas Hayes, being duly sworn, do depose and state as follows:

1. I am Vice President, Marketing/Development for Hye Crest Management, Inc.
2. I am familiar with the factual matters presented in Section 1 of the foregoing Response of Hye Crest Management, Inc. in File No. 10380-CF-P-88. Except for those factual matters of which official notice may be taken, which are matters of public record, or which are supported by separate affidavit, the factual matters presented in Section 1 are true to my personal knowledge.

10/13/88  
Date

Thomas Hayes  
Thomas Hayes

Subscribed and sworn before me this 13 day of October, 1988.

Louis S. Rosenthal  
Notary Public

My Commission Expires: 5-31-89

LOUIS S. ROSENTHAL  
Notary Public, State of New York  
No. 4803211  
Qualified in Bronx County  
Commission Expires May 31, 1989

CERTIFICATE OF SERVICE

I, Jennifer Garcia, a secretary in the law firm of Koteen & Naftalin, do hereby certify that copies of the foregoing "RESPONSE OF HYE CREST MANAGEMENT, INC.," with attachments, were mailed first-class U.S. Mail, this 14th day of October, 1988 to the following:

- \* Dennis R. Patrick  
Chairman  
Common Carrier Bureau  
Federal Communications Commission  
1919 M Street, N.W  
Room 814  
Washington, D.C. 20554
- \* James H. Quello  
Commissioner  
Common Carrier Bureau  
Federal Communications Commission  
1919 M Street, N.W  
Room 802  
Washington, D.C. 20554
- \* Patricia Diaz Dennis  
Chairman  
Common Carrier Bureau  
Federal Communications Commission  
1919 M Street, N.W  
Room 832  
Washington, D.C. 20554
- \* Gerald Brock, Chief  
Common Carrier Bureau  
Federal Communications Commission  
1919 M Street, N.W.  
Room 500  
Washington, D.C. 20554
- \* Hand Delivered

- \* James R. Keegan, Esq.  
Chief, Domestic Facilities Division  
Common Carrier Bureau  
Federal Communications Commission  
2025 M Street, N.W.  
Room 6010  
Washington, D.C. 20544
- \* Theodore R. Waddell, Esq.  
Chief, Domestic Radio Branch  
Common Carrier Bureau  
2025 M Street, N.W.  
Room 6310  
Washington, DC 20554
- \* Mr. Frank Peace, Jr.  
Common Carrier Bureau  
Federal Communications Commission  
2025 M Street, N.W.  
Room 6310  
Washington, D.C. 20554
- William B. Barfield, Esq.  
BellSouth Corporation  
1155 Peachtree Street, N.E.  
Suite 1800  
Atlanta, GA 30367-6000
- Thomas L. Welch, Esq.  
The Bell Atlantic Telephone Companies  
1710 H Street, N.W.  
Washington, D.C. 20006
- John D. Pellegrin, Esq.  
Pellegrin & Levine, Chartered  
1140 Connecticut Avenue, N.W.  
Suite 312  
Washington, D.C. 20036  
Counsel for National Spectrum  
Managers Association, Inc.

\* Hand Delivered

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Telegraph Company  
1020 19th Street, N.W.  
Suite 700  
Washington, D.C. 20036

Mary McDermott, Esq.  
NYNEX Telephone Companies  
120 Bloomingdale Road  
White Plains, NY 10605

William C. Sullivan, Esq.  
Southwestern Bell Telephone Company  
1010 Pine Street  
Room 2305  
St. Louis, MO 63101

International Transcription Services, Inc.  
2100 M Street, N.W.  
Suite 140  
Washington, D.C. 20037

/s/ Jennifer Garcia  
Jennifer Garcia

RECEIVED

JAN 26 1989

LAW OFFICES

MOTTEN & HAFTALIN

1500 CONNECTICUT AVENUE

WASHINGTON, D.C. 20006

Federal Communications Commission

Office of the Secretary

TELEPHONE

(202) 467-5700

TELECOPY

(202) 467-5915

CABLE ADDRESS

"KOBURT"

January 26, 1989

Mr. Robert H. Maddell  
Chief, Domestic Radio Branch  
Common Carrier Bureau  
Federal Communications Commission  
Washington, DC 20554

Re: File No. 10380-CF-P-88  
Collision WLT379

Dear Mr. Maddell:

In Reply of Hye Crest Management, Inc. (Hye Crest), this is to address the certain allegations made by National Spectrum Management Association (NSMA) in its Reply pleadings filed November 7, 1988 regarding the above-captioned application. These allegations were made for the first time in the "Reply" round of pleadings, so that Hye Crest has not had the opportunity to comment on them and to present its own analysis of these technical matters. It is requested that this letter be associated with the Commission's files in this proceeding.

We are filing concurrently an amendment to the above-referenced application containing a technical report prepared by microwave engineers, Raymond E. Boscard and Dr. Joseph F. White. The technical report is responsive to NSMA's Exhibit A and shows that, with the use of reasonable engineering practices, the 27.5 - 28.5 GHz band may be used by point-to-point links located immediately adjacent to and within the authorized service area of the Hye Crest point-to-point operations in the same band. It also shows that the calculations are based on unrealistic assumptions that are so overly conservative that they would never realistically be encountered in normal practice. For example, the NSMA assumptions ignore cross-polarization isolation and the additional isolation achieved by an interleaved channel plan. They assume power levels for point-to-point links that are far too high to be economically feasible. They assume a flat earth so that propagation distances are infinite. Most importantly, they ignore the noise floor which determines the minimum detectable signal level, and which further suppression of interference is not

Enclosure 1, Madrell  
August 16, 1969

In the attached technical report prepared by Bossard and White, it is demonstrated that if reasonable engineering practices are employed, harmful co-channel interference cases can be avoided.

ITW's conclusion (Reply, p.9) that point-to-point operations in the same service area as that to be served by Hye Crest would necessarily cause harmful interference to Hye Crest's operations is wrong. See particularly the analysis of Bossard and White in Case nos. 3 and 4. It should be added that there exists now a substantial body of engineering experience which can be employed to avoid harmful interference in the event any point-to-point system is to be operated in the vicinity of Hye Crest's proposed facilities. The Commission's rules also provide procedures for elimination of potential harmful interference cases which would be applicable. Hye Crest will comply fully with the Commission's rules and policies in Section 21.100(d) in the event that such a situation would ever arise.

The claim of NSMA (Reply, p.11) that frequencies above the 18 and 23 GHz bands will be utilized for point-to-point systems is undoubtedly true but proves nothing. Grant of Hye Crest's proposal will not unreasonably inhibit growth of foreseeable requirements for point-to-point links for all of the reasons which we have previously presented in this proceeding.

Contrary to the claims of NSMA (Reply, p.10), Hye Crest has completed the "final design" of its proposed facilities and will now have completed all filings required under the Commission's rules to demonstrate compliance with FCC equipment authorization standards. Hye Crest has now scheduled completion of the assembly of production prototypes of all of its proposed transmitter facilities and related testing. An amendment to the above captioned application being filed concurrently herewith discusses the current status of these efforts and the scheduling of testing. Models of Hye Crest's proposed transmit and receive antennas have already completed design review and testing and are being manufactured. The model numbers and antenna gain patterns for the transmit antennas are in the process of being submitted to the Commission in the above-referenced amendment filing.

ITW's Reply ignores the guidance given to the Commission in Section 21.100(d) of the Commission's Rules in WAIT Radio v. FCC, 418 F.2d 1157 (D.C. Cir. 1969) with respect to consideration of waiver

Mr. Theodore R. Waddell

January 21, 1989

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The Commission is charged with administration in the "public interest." That an agency may discharge its responsibilities by promulgating rules of general application which, in the overall perspective, establish the "public interest" for a broad range of situations, does not relieve it of an obligation to seek out the "public interest" in particular individual cases. A general rule, deemed valid because its overall objectives are in the public interest, may not be in the "public interest" if extended to an applicant who proposes a new service that will not undermine the policy, served by the rule, that has been adjudged in the public interest. An agency need not sift pleadings and documents to identify such applications, but allegations such as those made by petitioners, stated with clarity and accompanied by supporting data, are not subject to perfunctory treatment, but must be given a "hard look."

We have presented, with particularity, facts and circumstances showing that the public interest would be served by grant of the requested waivers as provided in Section 21.19 of the Commission's rules and that grant here will not undermine the operation of the Commission's existing rules. Waiver of Section 21.108 is fully justified to permit the uses and technical efficiencies of omnidirectional antennas rather than multiple point-to-point antennas for the reasons covered in Hye Crest's Response filed October 13, 1988. The proviso language of Section 21.108(a) specifically contemplates authorization of point-to-multipoint antenna facilities (and may even be interpreted to obviate the need for a waiver on this point). In addition, authorization of Hye Crest's proposed antenna facilities is not limited by the terms of Section 21.108(b) in view of the fact that there is no established "Standard A" or "Standard B" specification for the 27.5 - 29.5 GHz band.

The secondary waiver of the Commission's equipment authorization standards (Section 21.120) may not be necessary in the event the applicant's equipment testing can be completed before the Commission acts here. The numerous benefits of promoting the development of unused spectrum, expanded services to the public and innovative service offerings, among the other considerations addressed in Hye Crest's Response and its application are compelling evidence of the public interest to be served by grant.

Mr. Theodore R. Waddell  
January 26, 1989  
Page 4

Finally, we are also filing the attached Statement of Anthony M. Rutkowski dated January 5, 1989. This statement makes clear that NSMA has misconstrued and distorted the intended purpose and effect of the material which he drafted for Suite 12. As an expert, it is his opinion that frequency sharing between point-to-point and omnidirectional uses is ". . . clearly, easily viable in the frequency bands at issue." He also confirms his view that the rulemaking suggested by NSMA is premature.

We stand ready to supplement the foregoing showings with additional information to assist the Commission in its deliberations. We are also prepared to meet with interested parties in the event the Commission is disposed to call a meeting to discuss methods of effectuating cooperative use of the 27.5 - 28.5 GHz band in the New York SMSA. Such a meeting might be a useful way of addressing any remaining misconceptions of the parties questioning the suitability of such cooperative use.

Very truly yours,

*George Y. Wheeler*  
George Y. Wheeler

Enclosure

cc (w/enc): William B. Barfield, Esq.  
Thomas L. Welch, Esq.  
John D. Pellegrin, Esq.  
Dana A. Rasmussen, Esq.  
Mary McDermott, Esq.  
William C. Sullivan, Esq.

## STATEMENT OF ANTHONY M. RUTKOWSKI

The "Suite 12 Regulatory Strategy Update," attached as Exhibit B to the *Reply of the National Spectrum Managers Association* in a current FCC proceeding, was prepared by me in June 1987. At that time, I was a telecommunications consultant advising Suite 12 on regulatory policy matters. Currently, I am an official of the International Telecommunication Union in Geneva, Switzerland, holding the position of Chief, Telecommunication Regulations and Relations Between Members Division, and Senior Counselor to the Secretary-General.

This statement is intended to clarify certain aspects of the aforementioned "Strategy Update." In particular, in paragraph 4 of that document, I stated that a "cell scheme...makes shared use of the frequency band difficult...." What I was referring to in that statement was the sharing of a frequency band by two omni-directional licensees, and not to the sharing by an omni-directional licensee with a point-to-point licensee. It was my opinion at that time and continues to be my opinion now, that frequency sharing between point-to-point operations and an omni-directional use is already readily viable in the frequency bands at issue, by employing any of several techniques.

In the "Strategy Update," I suggested that Suite 12 apply for a Part 21 authorization pursuant to waiver of the Commission's Rules, and later submit a *Petition for Rule Making*. I understand that an affiliate of Suite 12, Hye Crest Management, has indeed filed an application for a Part 21 authorization, and that Hye Crest believes it is premature to submit a rule making petition. I see nothing inconsistent between my advice and the current Hye Crest action or position.

---

signed at Geneva, Switzerland

6 January 1989

William B. Barfield, Esq.  
Thomas L. Welch, Esq.  
John D. Pellegrin, Esq.  
Dana A. Rasmussen, Esq.  
Mary McDermott, Esq.  
William C. Sullivan, Esq.

11/20/81

KOTEEN & NAFTALIN  
FILE COPY 76  
Buck

Before The  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

RECEIVED

JAN 26 1980

In Re Application of  
HYE CREST MANAGEMENT, INC.

License for New Station in the  
Point-to-Point Microwave Radio  
Service in 27.5 - 29.5 GHz Band  
Toward Various Points in the  
State of New York

Federal Communications Commission  
Office of the Secretary

File No. 10380-CF-P-88

AMENDMENT

Hye Crest Management, Inc. ("Hye Crest") hereby amends the above-captioned application to supplement the information previously submitted in support of its requested rule waivers in Exhibit J to include the following:

1. Shared Frequency Uses At 27.5 - 28.5 GHz Based Upon Reasonable Engineering Practices.

The attached technical report prepared by microwave experts, Bernard B. Bossard and Dr. Joseph F. White, demonstrates that if reasonable engineering practices are employed, the 27.5 - 28.5 GHz band may be used by point-to-point links which are located within or adjacent to the service area of the point-to-multipoint facilities proposed by Hye Crest. From this report, it can be seen that the circumstances where unavoidable harmful interference resulting from such co-channel uses of the 27.5 - 28.5 GHz band can reasonably be anticipated are extremely rare and statistically insignificant.

2. Adequate Growth Capacity For Foreseeable Point-to-Point Uses.

Hye Crest adopts by reference its "Response" filed October 14, 1988 with respect to the public interest to be served by grant of its proposal. In that filing it is demonstrated that there is ample spectrum available to accommodate foreseeable growth of point-to-point links in the New York SMSA operating in frequency bands below, adjacent to and above the frequencies proposed by Hye Crest and that Hye Crest has made every reasonable effort to avoid blocking the growth of point-to-point links which are likely to need capacity in the foreseeable future. (Response, pp. 17-26)

3. Hye Crest's Commitment to Cooperate to Resolve Technical Conflicts.

Hye Crest confirms that it intends to comply with Section 21.100(d) of the Commission's rules by cooperating fully and making reasonable efforts to resolve any technical problems and conflicts which might inhibit effective and efficient use of the 27.5 - 28.5 GHz band for point-to-point links within its proposed service area without harmful interference.

4. Temporary Waiver of Equipment Authorization.

Hye Crest is now in the process of assembling production prototypes of the transmitter models to be employed for its commercial operation. Testing of the first model transmitter is scheduled for late January, 1989. A second transmitter model will be tested approximately 1 - 2 months thereafter. Based upon

evaluations of the subassemblies for these models, Hye Crest expects that its transmitters will comply fully with applicable Commission technical specifications. The Commission will be kept informed if, as expected, temporary waiver of Section 21.120 of the Commission's rules is no longer required.

5. Antenna Model Numbers and Antenna Gain Patterns.

Attached hereto is preliminary test data regarding the antenna gain patterns for the transmit antennas proposed by Hye Crest.

Respectfully submitted,  
HYE CREST MANAGEMENT, INC.

By: 

January 25, 1989

**TECHNICAL REPORT ON INTER-SYSTEM INTERFERENCE**

**Prepared by Mr. Bernard B. Bossard  
and Dr. J.F. White**

1

Technical Report on Inter-System Interference  
prepared by Mr. Bernard B. Bossard and Dr. J.F. White  
for Hye Crest Management, Inc.  
in Response to National Spectrum Managers Association

The calculations supplied by NSMA are based on unrealistic assumptions that reflect extraordinary circumstances which are not encountered under standard industry practices. This results in conclusions which are so restrictive as to preclude the mutual use of the 27.5 to 28.5 GHz band by both point-to-point and the Hye Crest television broadcast service.

When these restrictive assumptions are removed it is shown that both services can operate within the 27.5 - 28.5 GHz band at very close distances.

The restrictive assumptions are specifically as follows:

First, NSMA assumes that point-to-point microwave systems would use an EIRP of 55 dBW. This is far too much for a point-to-point microwave communication system that would typically use 0.1 watts with a 38 dBi gain antenna for an EIRP of 28 dBW. Appendix C relates the intrinsic characteristics of the 28 GHz frequency band which limits power output to typically 0.1 watt.

Second, the NSMA calculation assumes an unnecessarily high value (75 dB) for the carrier to interference ratio (C/I). In an FM system the C/I can be as little as 10 dB (Ref. 1, pg. 318). This is because with FM modulation, the stronger desired signal (C) readily "captures" the receiver, causing the weaker interference (I) to be rejected. Furthermore, the Hye Crest design criteria results in the interfering signal being substantially below the point-to-point receiver noise level thereby eliminating the need for a C/I ratio consideration.

Third, the NSMA calculation does not take the channel bandwidth of the Hye Crest system into consideration. Thus, while Hye Crest would transmit a 20 dBW signal, this is distributed over 24 separate television channels, each occupying 40 MHz bandwidth. Taking this into account, each channel carries 5 watts or less of power. This gives, with a 6 dB gain omnidirectional antenna (in the azimuthal plane) an EIRP = +13 dBW over a 50 MHz bandwidth channel.

Fourth, NSMA assumes a "flat earth" ( $K = \text{infinity}$ ), under which assumption radio waves would travel around the world without obstruction (See Appendix A for the impact on UHF television when this assumption is made.) In reality, over a smooth curved earth ( $K = 1$ ) the line of sight distance for two towers each 35 meters (113 feet) high is limited to only 30 Km (18 miles) (Ref. 2, pg. 642). Taking refraction of the atmosphere into account ( $K = 4/3$ ) extends this range over smooth earth to 30 miles. However, the earth is not smooth, particularly in New York City, where building, bridges, chimneys

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and other obstructions will serve to reduce the range of 28 GHz signals to well below these values. In any event, it will be seen from the following calculations that signal levels drop rapidly with distance and even with the flat earth assumption mutual interference is unlikely.

Fifth, the NSMA calculation assumes that the interfering signal arrives on the main lobe of the victim receiving antenna. FCC rules (para. 94.75) require that point-to-point communications be conducted using at least a 38 dBi antenna with sidelobes 24 dB down at 5 degrees off the main pointing direction. Reasonable practice is to sight outside of 5 degrees when in close proximity to an existing system (in this case within 5 degrees of the Hye Crest transmitting antenna). In such cases the effective gain of the victim antenna to the interference will be  $38 - 24 = 14$  dBi.

Sixth, the NSMA does not take into account that there is a noise floor (KTB) with all communications systems. As will be seen in the following calculations, it is the noise floor that establishes a minimum detectable signal (MDS) below which further suppression of interference is not necessary.

Seventh, the NSMA does not allow for polarization diversity and overlapping frequency interleaving which can produce combined isolation from potential interference of 50 dB in FM systems.

When all of the above factors are included (where appropriate) in the interference calculations it will be seen that point-to-point and the Hye Crest point-to-multipoint system can both operate without mutual interference provided that reasonable and customary good engineering practice is employed.

The Hye Crest analysis does not include the rejection of interference utilizing different modulation methods which would provide additional isolation.

Satellite earth stations, although considered to be point-to-point transmitters, are recognized to have significant sidelobe levels up to +55 dBW (see Section 25.204(a) of the FCC Rules and Regulations), making in effect point-to-multipoint transmitters. Consequently, there is precedent for simultaneous operation of point-to-point and point-to-multipoint operation in the same band (at 6 GHz); yet, if the interference estimating methods employed for the NSMA calculations are applied to this common communication band, an intolerable separation distance (125,000,000 miles) is obtained. (See Appendix B.) Thus, the NSMA assertion that point-to-point and point-to-multipoint cannot share a common frequency band is contrary to existing radio practice. Note that orthogonal polarization and frequency interleaving are not available for isolation between terrestrial microwave and satellite uplinks at 6 GHz since both are already used in the satellite uplink.

The following calculations treat four cases of potential interference with the results summarized below:

- Case 1) Hye Crest transmitter interfering with point-to-point receiver within a cell.  
NO INTERFERENCE OCCURS WHEN THE POINT-TO-POINT NETWORKS USE TRANSMIT/RECEIVE SITES WHICH ARE PLACED AT LEAST 660 FEET (1/8) MILE FROM AND ORIENTED AT AN ANGLE OF AT LEAST 5 DEGREES AWAY FROM THE DIRECTION TO THE HYE CREST OMNI ANTENNA.
- Case 2) Hye Crest transmitter interfering with point-to-point receiver beyond a cell.  
NO INTERFERENCE IS EXPERIENCED REGARDLESS OF POINTING DIRECTION.
- Case 3) Point-to-point transmitter interfering with Hye Crest receiver within a cell.  
A POINT-TO-POINT SYSTEM WILL NOT INTERFERE WITH THE HYE CREST SERVICE UNDER THE SAME RESPECTIVE ASSUMPTIONS USED FOR CASES 1) AND 2) AND THE ADDITIONAL CONDITION THAT IT IS AT LEAST 5 DEGREES OFF AXIS AND NOT CLOSER THAN 1000 FEET TO A HYE CREST SUBSCRIBER RECEIVER, OR, WITH 10 DEGREES OFF AXIS SIGHTING, NOT CLOSER THAN 581 FT.
- Case 4) Point-to-point transmitter interfering with Hye Crest receiver beyond a cell.  
THE POINT-TO-POINT CAUSES NO INTERFERENCE REGARDLESS OF SIGHTING DIRECTION.

Even these modest restriction to avoid interference can be further relaxed if point-to-point system uses a different modulation than that of the Hye Crest system. To be conservative in three calculations, both systems were assumed to have the same FM signal modulation format.

#### ASSUMPTIONS

The following assumptions are made in the interference calculations made for Cases 1), 2), 3) and 4) which follow.

- a) The potential interfering signal (I) is not disruptive to the point-to-point carrier (C) when the level of I is 3 dB or more below the noise threshold for the receiver which receives C. (Ref. 1, pg. 318)
- b) A worst case scenario is assumed whereby the point-to-point system uses the same FM signal format as the Hye Crest system. (For different modulations, additional isolation will be obtained due to the receiver selectivity to different modulations.)

- c) The point-to-point and Hye Crest systems use orthogonal polarizations, thereby deriving at least 25 dB of isolation. (Ref. 1, pg. 502)
- d) The point-to-point system uses a frequency interleaved channel plan with respect to Hye Crest, as is employed by satellites operating in the 3.7-4.2 GHz band, thereby deriving an additional 25 dB of isolation. (Ref. 4, pg. 266)
- e) The point-to-point system uses antennas which meet the FCC regulations for gain and sidelobes for the 27.5-29.5 GHz band, including 38 dB minimum gain, -24 dB minimum sidelobe isolation at 5 degrees off boresight, -29 dB at 10 degrees.

#### CALCULATIONS

Case 1) WITHIN THE 4 TO 5 MILE RADIUS OF A HYE CREST OMNI TRANSMITTER, TRANSMISSIONS FROM THE HYE CREST CENTRAL MODE TRANSMITTER WILL NOT INTERFERE WITH POINT-TO-POINT COMMUNICATION NETWORKS WHEN THOSE NETWORKS USE TRANSMIT/RECEIVE SITES WHICH ARE PLACED AT LEAST 660 FEET (1/8 MILES) FROM AND ORIENTED AT AN ANGLE OF AT LEAST 5 DEGREES AWAY FROM THE DIRECTION TO THE HYE CREST OMNI ANTENNA. THE PROBABILITY THAT A POINT-TO-POINT RECEIVER WILL BE WITHIN 660 FEET OF A HYE CREST TRANSMITTER IS ONLY 0.0016%.

In this calculation the point-to-point system with transmitter/receiver sites at A and B is operated within 660 feet (1/8 mile) of the Hye Crest omni transmitter C and on an azimuthal heading which is at least 5 degrees off of the heading from A to C. (See Figure 1).

The Hye Crest system radiates a maximum of 5 watts per 40 MHz channel using an antenna which has a uniform azimuthal pattern and an overall gain of 6 dBi, for resulting EIRP (effective isotropic radiated power) of 13 dBW.

The path loss of the signal from C to A is given by (Ref. 1, pg. 250)

$$\text{FSL (db)} = 36.58 + 20\log(F) + 20\log(d) \quad \text{Equation 1.}$$

where

FSL (db) is the free space attenuation in decibels  
 F is the carrier frequency in megahertz  
 d is the distance in statute miles

For a carrier at 28 GHz and a distance of 1/8 mile,

$$\begin{aligned} \text{FSL (dB)} &= 36.58 + 20\log(28,000) + 20\log(1/8) & \text{Equation 2.} \\ &= 36.58 + 88.94 - 18.06 \\ &= 108 \text{ dB} \end{aligned}$$

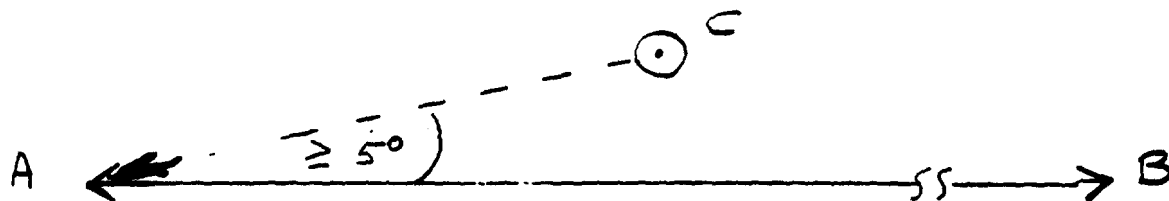


FIGURE 1

A: PPM-RC  
B: PPM-TX  
C: HC-TX

Assume a point-to-point antenna at A with 38 dBi gain, a sidelobe which is 24 dB below at 5 degrees off boresight, per FCC regulations, and a polarization isolation of -25 db; then the gain in the direction of C is

$$\text{Gain (AC)} = 38 \text{ dBi} - 24 \text{ db} - 25 \text{ db} = -11 \text{ dBi}$$

Assume an interleaved frequency plan between the point-to-point system and the Hye Crest system; for example, if the Hye Crest channel is at 28000 MHz then the point-to-point frequencies are 27980 and 28020 MHz. This yields an FM selectivity (S) separation of

$$S = 25 \text{ dB}$$

Then the maximum interfering signal from C to A is given by

$$I(\text{CA}) = \text{EIRP}(\text{C}) - \text{FSL}(\text{CA}) + G(\text{AC}) - S \quad \text{Equation 3.}$$

$$\begin{aligned} &= 13 \text{ dBW} - 108 \text{ dB} + (-11 \text{ dBi}) - 25 \text{ dB} \\ &= -131 \text{ dBW} \end{aligned} \quad \text{Equation 4.}$$

On the other hand, the minimum threshold FM signal (MTS) at A is given by (See Ref. 1, pg. 74, Eq. 2.34)

$$\text{MTS} = -204 \text{ dBW} + 10\log(\text{BW}) + \text{NF} + 10 \quad \text{Equation 5.}$$

where

MDS is the noise floor (in dBW at 290 deg/K or 17 deg/C)

BW is the receiver IF bandwidth in Hz

NF is the noise figure of the receiver in dB

10 dB is the minimum FM signal above noise to permit FM enhancement

The noise figure of a commercial receiver available in the 23 GHz band, such as the M/A-COM Inc. Model 23-VFM, is about 12 dB. Commercial receivers (other than those produced by Hye Crest) are not currently available at 28 GHz, but their noise figure, when available, can be expected to be no better than that at 23 GHz.

Accordingly, the MTS at A is given by

$$\text{MTS(A)} = -204 \text{ dBW} + 10\log(40,000,000 \text{ Hz}) + 12\text{dB} + 10\text{dB} \quad \text{Equation 6.}$$

$$= -204 \text{ dBW} + 76 \text{ dB} + 12 \text{ dB} + 10 \text{ dB}$$

$$= -106 \text{ dBW}^1$$

Since the MTS(A) is -106 dBW (the noise floor is at -116 dBW) and the interference is at -131 dBW, the signal from the Hye Crest omni transmitter is well below the noise level at A and would not interfere with the communication of the point-to-point system from A to B.

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<sup>1</sup> Receiver threshold for M/A-COM MA-23VFM receiver at 23 GHz is -72 dBm (-102 dBW)

Consequently, the point-to-point receiver may be located as close as 660 feet (1/8) to a Hye Crest transmitter without receiving interference. Yet the probability of this occurring is only 0.0016%. This is calculated as follows: the probability is the ratio of the volume of a hemisphere of 1/8 mile radius to the volume of a hemisphere of 5 mile radius. This ratio is equal to the ratio of the cubes of the radii:  $(1/8)^3 / (5)^3 = 0.0000156 = 0.0016\%$ .

Case 2) THE POINT-TO-POINT TRANSMITTER AND RECEIVER ARE BOTH OUTSIDE OF THE 4 TO 5 MILE RADIUS SERVICE AREA OF THE HYE CREST OMNIDIRECTIONAL TRANSMITTER (SEE FIG. 2) IN THIS CASE NO INTERFERENCE IS EXPERIENCED BY THE POINT-TO-POINT SYSTEM REGARDLESS OF ITS POINTING DIRECTION.

A worst case scenario is assumed in which the point-to-point transmitter/receivers (A and B) are on a direct heading the Hye Crest omnidirectional transmitter (C). It is further assumed that there is a negligible distance between A and B. Then A is 5 miles from C and on a direct heading with C.

The interference I at A is found by reapplying Equation 1 and 3 to this case. First, the free space loss, FSL, for the 5 mile range at 28 GHz, is

$$\begin{aligned} \text{FSL (dB)} &= 36.58 + 20\log(28,000) + 20\log(5) \\ &= 36.58 + 88.94 + 13.98 \\ &= 139.5 \text{ dB} \end{aligned} \quad \text{Equation 7.}$$

Applying this FSL and a victim antenna gain  $G(\text{CA}) = 13 \text{ dB}$  (corresponding to an antenna gain of 38 dB - 25 dB for cross polarization isolation) at A to the remaining conditions used for Equation 4 gives

$$\begin{aligned} I(\text{CA}) &= 13 \text{ dBW} - 139.5 \text{ dB} + 13 \text{ dB} - 25 \text{ dB} \\ &= -138.5 \text{ dBW} \end{aligned} \quad \text{Equation 8.}$$

Again it is seen that this signal is well below the noise floor of -116 dBW at A and therefore causes no interference with the point-to-point system.

Case 3) A POINT-TO-POINT SYSTEM WILL NOT INTERFERE WITH THE HYE CREST SERVICE UNDER THE RESPECTIVE ASSUMPTIONS USED FOR CASES 1 AND 2 AND THE ADDITIONAL CONDITION THAT IT IS NOT CLOSER THAN 1000 FEET FROM A HYE CREST SUBSCRIBER RECEIVER AT 5 DEGREES OFF AXIS, OR 581 FEET AT 10 DEGREES OFF AXIS SIGHTING.

Here it is assumed that a point-to-point system operates within the 4 to 5 mile radius Hye Crest service area in the same band and with the same FM signal format. It employs frequency interleaving, cross polarization, and a 38 dBi antenna meeting FCC sidelobe regulations, including 24 dB sidelobe isolation at 5 degrees off axis and 29 dB at 10 degrees. (See Figure 3.)

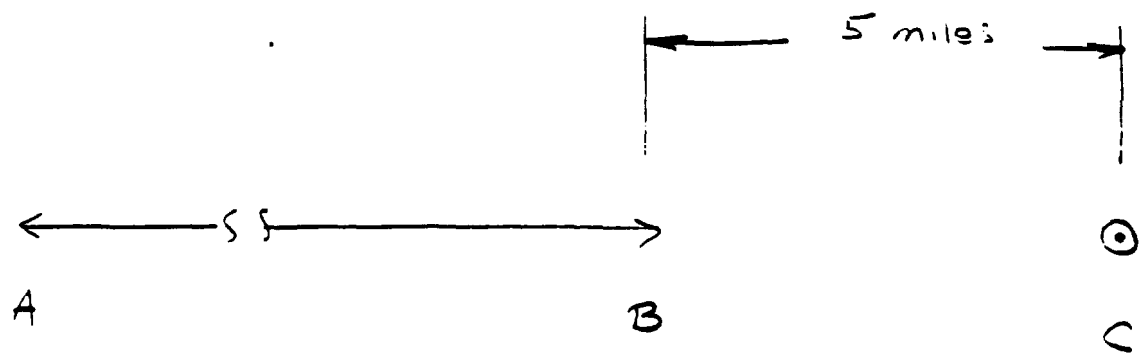


FIGURE 2

In order for the point-to-point system (transmitter/receivers A and B in Figure 3) not to interfere with the Hye Crest desired signal, the interference signal  $I(D)$  must be at least 3 dB below the -116 dBW noise floor. For this calculation, then, the interfering signal arriving at the Hye Crest subscriber from the point-to-point transmitter at A is not to exceed -119 dBW.

This power level will be used to estimate the minimum range (d) to be allowed between the point-to-point transmitter A and the Hye Crest subscriber D (shown in Figure 3) from the following relationship.

$$I(D) = EIRP(A) - FSL + G(DA) - S \quad \text{Equation 9.}$$

where

$EIRP(A)$  is effective isotropic radiated power of the interfering transmitter

$FSL$  is the free space loss

$G(DA)$  is the gain of the victim receiving antenna in the direction of the interfering transmitter

$S$  is the selectivity of the victim receiver to the desired relative to the interfering signal

In this calculation a point-to-point transmitter of 0.1 watts is assumed to be used with a 38 dBi antenna for an  $EIRP(I)$  of 28 dBW. The victim receiver also uses a 38 dBi gain antenna with 24 dB maximum sidelobe (per FCC regulations) at 5 degrees off boresight heading. It also has 25 dB cross polarization rejection. The resulting  $G(DA)$  is therefore  $38 - 24 - 25 = -11$  dBi. Finally, interleaved 40 MHz signal bandwidths are assumed, yielding a selectivity  $S = 25$  dB. Substituting the above values into Equation 9 gives

$$-119 \text{ dBW} = 28 \text{ dBW} - FSL + (-11 \text{ dB}) - 25 \text{ dB} \quad \text{Equation 10.}$$

and solving for  $FSL$  gives

$$\begin{aligned} FSL &= (+28 -11 +119 -25) \text{ dB} \\ &= 111 \text{ dB} \end{aligned} \quad \text{Equation 11.}$$

Substituting this value into Equation 1 to solve for the distance gives the minimum separation for a 5 degree off axis sighting,

$$\begin{aligned} 111 \text{ dB} &= 26.6 + 88.8 - 20\log(d) \\ 20\log(d) &= -14.5 \text{ dB} \\ d &= 0.19 \text{ mile (1000 feet)} \end{aligned}$$

Alternatively, if the point-to-point system is sighted 10 degrees off of the Hye Crest omni heading, then the sidelobe isolation of the antenna at D will be increase from 24 to 29 dB. The resulting separation  $d$  can be reduced to .11 miles (581 feet).

From this result it follows that the point-to-point transmitter can be located within the 5 mile service radius of the Hye Crest system and will not cause interference with any of